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EXAMINER

LU, TOM Y

ART UNIT PAPER NUMBER

2621

DATE MAILED: 05/06/2004

3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/864,105

Applicant(s)

ROSE, DAVID WALTER

Examiner

Tom Y Lu

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1, 2, 5, 6, 7, 11, 12, 15, 16, 17, 18, 19 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Abbott et al (U.S. Patent Application No. 2004/0057046 A1, a copy of Provisional Application 60/230,281 is attached).

- a. Referring to Claim 1, Abbott discloses projecting a two-dimensional pattern of alternating relatively lighter and relatively darker regions upon a surface at a first angle relative to said surface (a light box 15 having a set of light bulbs 16 and a patterned diffuser 17 are used to project the claimed “two-dimensional pattern” as shown in figure 6a, paragraph [0049]); capturing an image of said pattern from a second angle relative to said surface (CCD cameras 18 are used to capture the projected pattern, paragraph [0050]); and processing said image to produce a profile of said surface (processor 20 is used to process the captured image to determine the characteristics of the surface, [0051]).
- b. Referring to Claim 2, Abbott discloses projecting activity projects discrete multiple ones of said patterns (see figure 6a, paragraph [0049]); capturing activity

captures an image of each of said patterns ([0050]); and processing activity processes each of said images ([0051]).

- c. Referring to Claim 5, Abbott discloses producing an image signal in response to said image (the distances D1 and D2, which as shown in figure 6a, are obtained based on the acquired image through CCD cameras and the process performed by a computer system); and correlating said image signal with a reference signal (comparing the distance D1 or D2 with the distance between edges of a flat surface. The distance between edges of a flat surface is the claimed "reference signal", paragraph [0069]) to produce said profile of said surface (the profile of the surface is by obtaining the amplitude of roller wave distortion, paragraph [0053], to determine whether it is a convex reflecting surface or concave reflecting surface, or flat surface, which are the characteristics of the surface).
- d. Referring to Claim 6, Abbott discloses configuring said reference signal to correspond to said pattern projected by said projecting activity (the distance between edges of a flat surface is the distance between edges of projecting pattern).
- e. Referring to Claim 7, Abbott discloses partitioning said image into at least one image region (the partitioned region in Abbot is the region between two edges 58, see figure 6a), wherein one said image region is responsive to a portion of said pattern projected upon said surface (the partitioned region between edges 58 is responsive to a portion of said pattern of stripes, which is projected using a diffuser 10 as described in paragraph [0066]); producing an image signal (image

signal is the distance D1 or D2, which as explained in Claim 5, are obtained from image acquired by CCD cameras and the process performed by the computer system) in response to said one image region; correlating said image signal with a reference signal configured to correspond to said image region to produce a correlation signal (the correlation signal is whether or not the surface is concave or convex); and determining, in response to said correlation signal, a relative height of surface upon which said portion of said pattern was projected (the amplitude of the roller wave distortion is obtained, paragraph [0053]).

- f. With regard to Claim 11, all limitations are addressed in Claim 1.
- g. Referring to Claim 12, Abbott discloses at least three of said relatively lighter regions extending across a width of said pattern; and at least two of said relatively darker regions extending across said width of said pattern, wherein each of said relatively darker regions is positioned between adjacent ones of said relatively lighter regions, and wherein said relatively lighter regions and said relatively darker regions together form a length of said pattern substantially perpendicular to said width thereof (see figure 6a).
- h. Referring to Claim 15, Abbott discloses two dimensional pattern has a width and a length; said camera is a first camera configured to capture a first image of said pattern over a first portion of said width; said system comprises a second camera configured to capture a second image of said pattern over a second portion of said width; said computer is configured to integrate said first and second captured images and produce a profile of said surface therefrom (see figure 4).

- i. Referring to Claim 16, Abbott discloses said projector is configured to project said pattern with said relatively lighter of substantially a predetermined monochromaticity; and said camera is filtered to be sensitive to said relative lighter regions of substantially said predetermined monochromaticity (see figure 6a, paragraph [0066]).
- j. Referring to Claim 17, Abbott discloses said projector comprises a laser; and said laser produces said relatively lighter regions of substantially said predetermined monochromaticity (paragraphs [0066] and [0074]).
- k. Referring to Claim 18, Abbott discloses wherein said projector is a stroboscopic projector (the projector in Abbott is a stroboscopic projector).
- l. With regard to Claim 19, see explanation in Claim 1.
- m. Referring to Claim 20, Abbott discloses wherein said two-dimensional pattern is configured to have a higher mathematical autocorrelation function in one direction (it is a pattern of stripes, of course, mathematical autocorrelation function in one direction is higher than the other).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- 2. Claims 8-9 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Abbott.

- a. With regard to Claim 8, the only difference between Claim 8 and Claim 7 is Claim 8 calls for partitioning the image into 25 regions. Abbott discloses there can be a plurality of regions (note an example of region is described in Claim 7). Abbott at paragraph [0066] teaches the 5 stripes (5 regions created based on these 5 stripes) are constructed based on 4 spaced, parallel transparent regions 50. Abbott at paragraph [0116] implies the his invention can be modified in many ways, which a person of ordinary skill in the art would have been motivated to modify the number of transparent regions from 4 to at least 25 to create 25 image regions, and have an image signal corresponds to each of the regions.
 - b. With regard to Claim 9, see explanation in Claims 5 and 8.
3. Claims 3-4, 10, 13, 14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abbott in view of Fukuhara (U.S. Patent No. 4,653,316). All the arguments and applicability in Claims 1 and 11 are incorporated herein.
 - a. Referring to Claim 3, Abbott discloses a system using projector 15 and camera 18 to obtain characteristics of glass surface. However, Abbott does not teach applying the system on detecting road surface. Fukuhara discloses a system using a projector 24B and cameras 22 and 23 to detect characteristics of the road surface to create transverse profile and longitudinal profile of the road surface (Fukuhara: column 1, lines 32-52). By applying Abbot's system in road surface detecting environment as described in Fukuhara, the combination of Abbot and Fukuhara teaches a projector is configured to effect said projecting activity, wherein vehicle is configured to move in a vehicular direction and said width is substantially

perpendicular to said vehicular direction; a camera is configured to effect said capturing activity; and moving said vehicle over said surface in said vehicular direction while effecting the projecting and capturing activities so as to obtain the captured image. At the time the invention was made, a person of ordinary skill in the art would have been motivated to do this because Abbott at paragraph [0116] teaches his invention can be applied in many forms not limited to glass surface detection, which implies it can be applied to road surface detection as described in Fukuhara.

- b. Referring to Claim 4, the combination of Abbott and Fukuhara teaches repeating said projecting and capturing activities at intervals along said vehicular direction to obtain a series of said captured images; and deriving a profile of said surface in substantially said vehicular direction from said series captured image (Abbott: paragraph [0060]; Fukuhara: column 1, lines 32-52).
- c. With regard to Claim 10, see explanation in Claims 3, 4 and 8.
- d. With regard to Claim 13, see explanation in Claims 3 and 4.
- e. With regard to Claim 14, see explanation in Claims 3 and 4.
- f. With regard to Claim 21, see explanation in Claim 1, 3 and 4.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Huber et al, U.S. Patent No. 5,561,526, see figures 4a and 12.
- b. Khattak, U.S. Patent No. 4,899,296, see figures 1 and 4-6.

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c. Powell et al, U.S. Patent No. 4,958,306, see figures 1 and 4-6.

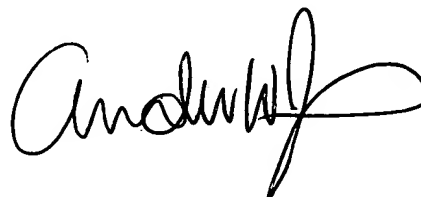
d. Lu et al, U.S. Patent No. 6,252,623 B1, see figures 2-6.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu



**ANDREW W. JOHNS
PRIMARY EXAMINER**